

## 4.0 Public Page

The repair and remediation of in-service pipelines is a safety critical process that must be closely controlled, but which must nevertheless be performed using cost-effective techniques. For large diameter pipelines, the use of manual welding is time-consuming and there is a greater risk of operator error due to the long welding times. Similarly, higher strength pipelines require precise weld bead placement to ensure correct tempering of previous weld layers and the electrodes conventionally used will not provide adequate weld metal properties on pipe grades above X80. There is, therefore, a need to develop advanced welding repair and remediation methods for in-service pipelines.

Working in collaboration with TransCanada Pipeline (TCPL), Pipeline Research Council International (PRCI), and the Welding Engineering Research Centre of Cranfield University, Edison Welding Institute (EWI) is working a project funded by the U.S. Department of Transportation's Research and Special Programs Administration to extend the current capabilities of in-service welding by developing an automated welding system for use on in-service pipelines.

The project is comprised of the following tasks:

1. Review of Industry Needs, Requirements, and Current Practices - in process
2. Technical Specifications for Automated In-Service Welding System - in process
3. Design and Build of Automated In-Service Welding System - in process
4. Laboratory Development and Evaluation
5. Weld Procedure Qualification
6. Field Testing and Validation
7. Final Report

The mechanized, multi-axis welding carriage with adaptive control/tracking for low hydrogen gas metal arc welding (GMAW) and flux-cored arc welding (FCAW) processes is currently under development. Functionality options have been defined for the system hardware to characterize the outside contour of a pipeline which contains corrosion damaged areas. The welding system has been assembled and development continues on the motion control software. The next step is to determine the configuration in which the weld repair layer(s) will be deposited.

The major objectives of this program are to:

- Develop an automated welding system for use on in-service pipelines
- Implement a real-time adaptive control system to ensure reliable welding conditions
- Evaluate system performance through laboratory trials
- Validate the system and gain regulatory approval by qualification of procedures complying with recognized industry standards and perform field trials

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